

**ABSTRACT OF THE DISCLOSURE**

A mixed metal oxide, which may be an orthorhombic phase material, is improved as a catalyst for the production of unsaturated carboxylic acids, or unsaturated nitriles, from alkanes, or mixtures of alkanes and alkenes, by: contacting with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acids and hydrogen peroxide to form a contact mixture; recovering insoluble material from the contact mixture; calcining the recovered insoluble material in a non-oxidizing atmosphere; admixing the calcined recovered insoluble material with (i) at least one promoter element or compound thereof and (ii) at least one solvent for the at least one promoter element or compound thereof; removing the at least one solvent to form a catalyst precursor; and calcining the catalyst precursor.